R Syllabus

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1 FIRST CLASS - THE BASICS

The goal of this class is to introduce the basics of R and get students comfortable working in RStudio. It also serves as a good time to make sure that all students have R and RStudio up and running on their computers.

1.1 CLASS EXPECTATIONS

1. Use the basic math operators (+, -, *, /)
2. Use the assignment operator and how to use it (<-)
3. Understand what a function is, how to use a function, and understand some basic functions
4. Understand the three most common data classes (character, numeric, logical)
5. Apply the basic comparison operators (>, <, ==, >=, <=)
6. Compare objects, and predict the data classes and how they change when comparing objects

2 SECOND CLASS - DATA STRUCTURES

Be sure to review the information from the previous class (5-10 minutes). Then go over the four basic data structures. Be sure to emphasize the similarities and differences between the data structures. Finally, discuss how to subset each structure, again emphasizing similarities and differences.

2.1 Class expectations

1. Understand the basic R data structures (vector, matrix, list, data frame)
2. Subset the four basic data structures

3 Third Class - Plotting Data

Start this class by introducing how to import data from a csv file. Then review of subsetting by using examples from the imported data, as understanding how to subset the data will make plotting much easier. Then go over the arguments of the basic plot function.
It would be good if you made a lesson plan for this yourself with data that you find interesting. Please write it up in the same format as the other documents and save it to the GitHub so others can use it.

3.1 Class expectations

1. Import data from a csv file format
2. Use the arguments of the plot function
3. Make basic plots

4 Fourth Class - Control Statments

This is typically the most challenging class for a lot of students. This class does not require a review of plotting to be successful. Make sure to start with very simple examples and only build complexity as the students are understanding. This is a really important concept and takes some patience to teach well.

4.1 Class expectations

1. Implement the three basic control statements in R (for-loops, if/else statements, and while statements)
2. Learn the and/or operators for combining logical statements

5 Fifth Class - Functions

If your students are struggling with control loops it would be good to do more control loop practice today and push this lesson back a day. Todays goal is to teach how to write and use functions in R. Be sure to emphasize why they would want to know how to write functions and how functions would be able to help in their research.

5.1 Class expectations

1. Write and run a basic function in R
2. Understand function environments and how functions find things
3. Understand the "do not repeat yourself" (DRY) principle

6 Sixth Class - Packages

You may not reach this lesson if your students struggled with control loops and that's okay. You can alway hand out the lecture notes to those students that are interested. The focus of this lecture is on doing reproducible coding (something we can all work on).

6.1 Class expectations

1. Install and load R packages
2. Consider some principles of reproducible research
3. Know the basic components of an R package
4. Create a simple R package using RStudio and roxygen2

7 Seventh and Eighth Classes - Final Projects

Devote the last two classes to working on a final project of your choosing. This can be done individually or in groups. Some sample projects will be provided.